

## Low Mach Scramjet Cavity Flameholder Stabilization, Phase I

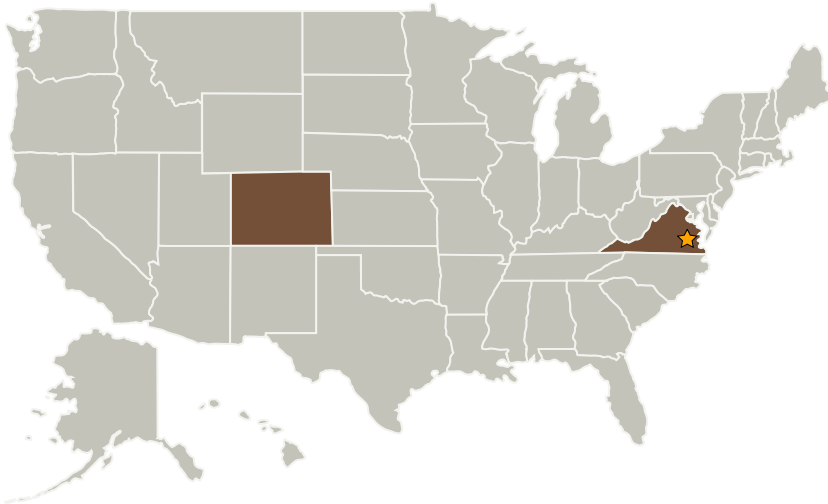
Completed Technology Project (2004 - 2004)



## Project Introduction

This proposal addresses a NASA solicitation topic A2.06 need for propulsion system flow control. A dual mode ram/scram engine is the most likely cycle for the high-speed propulsion flowpath of turbine and rocket based combined cycle engines, but its feasibility with storable liquid hydrocarbon fuels remains to be demonstrated. A key reason is that a stable, low drag engine pilot for the needed operational envelope has eluded us. Due to its simplicity, the cavity flameholder is the subject of renewed investigation, but it suffers from acoustically coupled combustion instabilities originating in the shear flow. Active control of the shear flow over the cavity could substantially improve flameholding stability. Therefore, TDA Research, Inc. (TDA) proposes an active control strategy having no moving parts to manipulate the spectral content and amplitude of shear layer disturbances, and hence control the coupling responsible for resonance and unsteady flow response that leads to premature flame extinguishment. The proposed experimental and analytical development effort will produce a robust, stable and low drag scramjet engine pilot.

## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
TDA Research, Inc.	Supporting Organization	Industry	Wheat Ridge, Colorado



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Langley Research Center (LaRC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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### Primary U.S. Work Locations

Colorado

Virginia

### Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

James Nabity

### Technology Areas

**Primary:**

- TX15 Flight Vehicle Systems
  - └ TX15.1 Aerosciences
    - └ TX15.1.5 Propulsion Flowpath and Interactions